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(54) **DEVICE BLOCKING TOOL**

(71) Applicant: **BANK OF AMERICA CORPORATION**, Charlotte, NC (US)

(72) Inventors: **Rahul G. Isola**, Charlotte, NC (US); **Anthony P. Grossi**, Glencoe, IL (US); **Patrick M. Sweet**, Albany, NY (US)

(73) Assignee: **Bank of America Corporation**, Charlotte, NC (US)

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H04W 84/12 (2009.01)
H04W 88/12 (2009.01)

(52) **U.S. Cl.**
CPC ***H04L 63/101*** (2013.01); ***H04L 63/0876*** (2013.01); ***H04L 63/14*** (2013.01); *H04W 84/12* (2013.01); *H04W 88/12* (2013.01)

(58) **Field of Classification Search**
USPC 726/4
See application file for complete search history.

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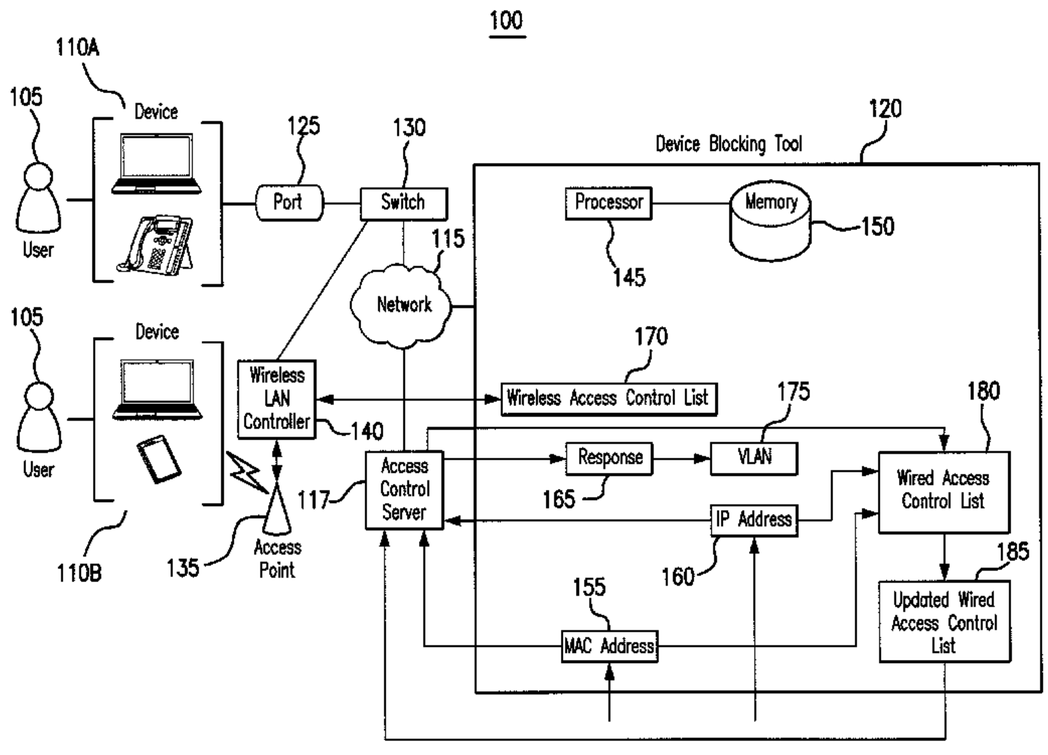
Primary Examiner — Jason K Gee
Assistant Examiner — Angela R Holmes
(74) *Attorney, Agent, or Firm* — Baker Botts L.L.P.

(57) **ABSTRACT**

A wireless device blocking tool includes a user interface, a location engine, and a connection engine. The user interface receives at least one of a MAC address and an IP address of a device. The location engine communicates a query to an access control server, receives a response from the access control server, and determines, based on the response, whether the device connected to a network through a wireless connection or a wired connection. If the device connected through the wireless connection, the location engine determines a WLC through which the device connected and if the device connected through the wired connection, the location engine determines a switch through which the device connected. The connection engine connects to the determined WLC if the device connected through the wireless connection and connects to the determined switch if the device connected through the wired connection.

18 Claims, 5 Drawing Sheets



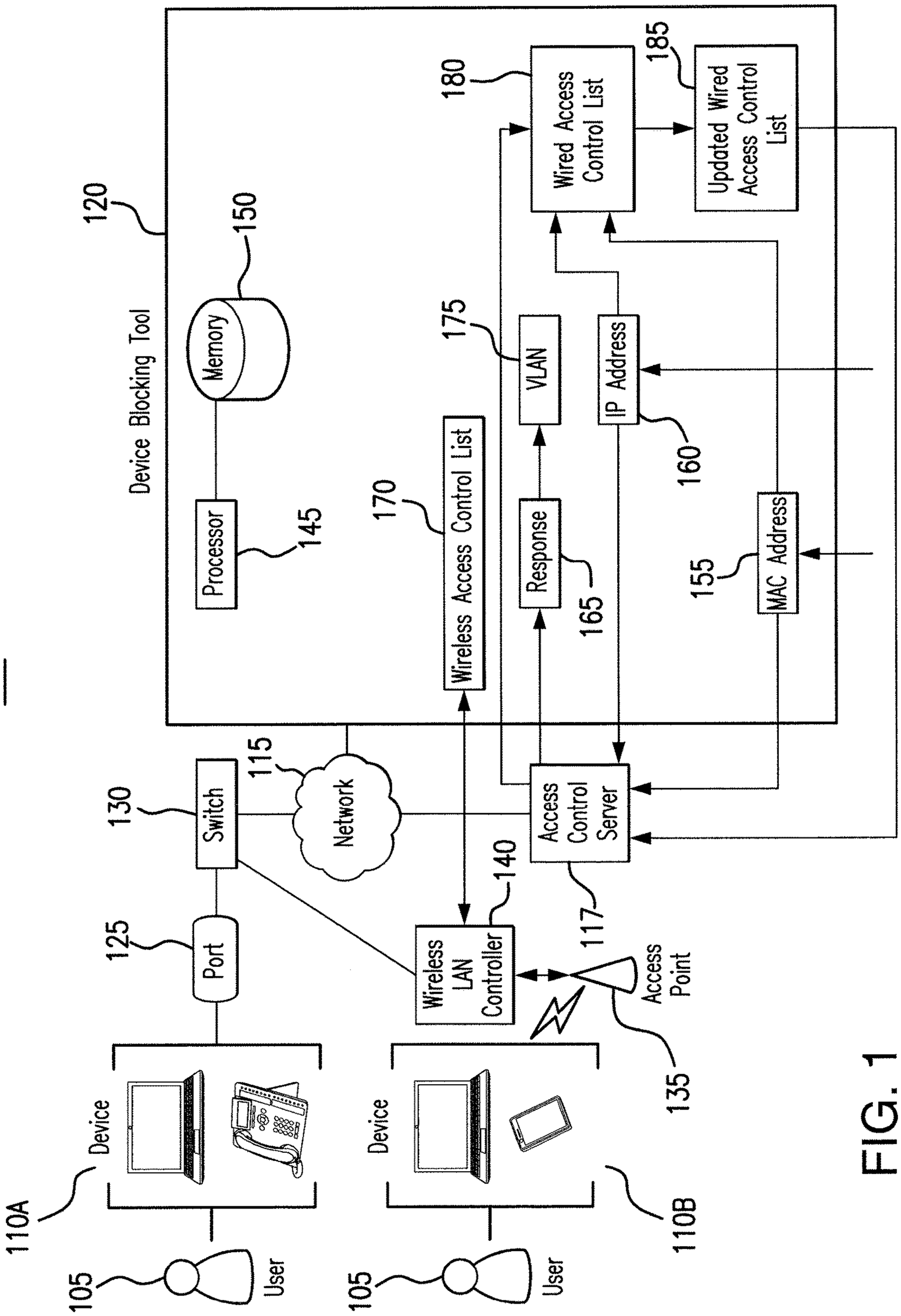

100
Device Blocking Tool
120
150
Memory
Processor
145
180
Wired Access Control List
185
Updated Wired Access Control List
175
VLAN
IP Address
160
170
Wireless Access Control List
Response
165
155
MAC Address
130
Switch
115
Network
140
Access Control Server
117
125
Port
Wireless LAN Controller
Access Point
135
110A
Device
105
User
110B
Device
105
User

FIG. 1

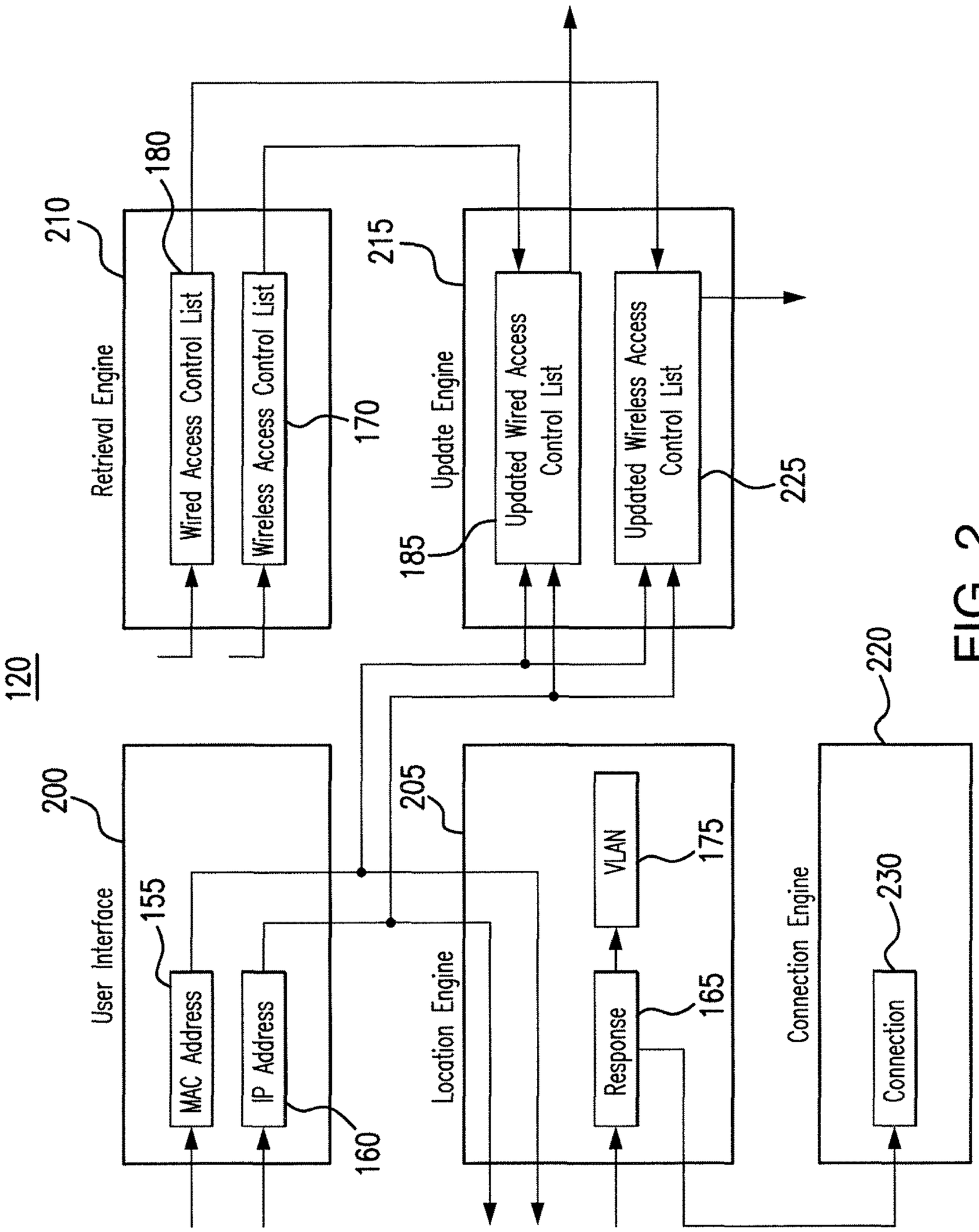

120
200
User Interface
155
MAC Address
IP Address
160
180
210
Retrieval Engine
Wired Access Control List
Wireless Access Control List
170
205
Location Engine
VLAN
175
Response
165
215
Update Engine
185
Updated Wired Access Control List
Updated Wireless Access Control List
225
220
Connection Engine
230
Connection

FIG. 2

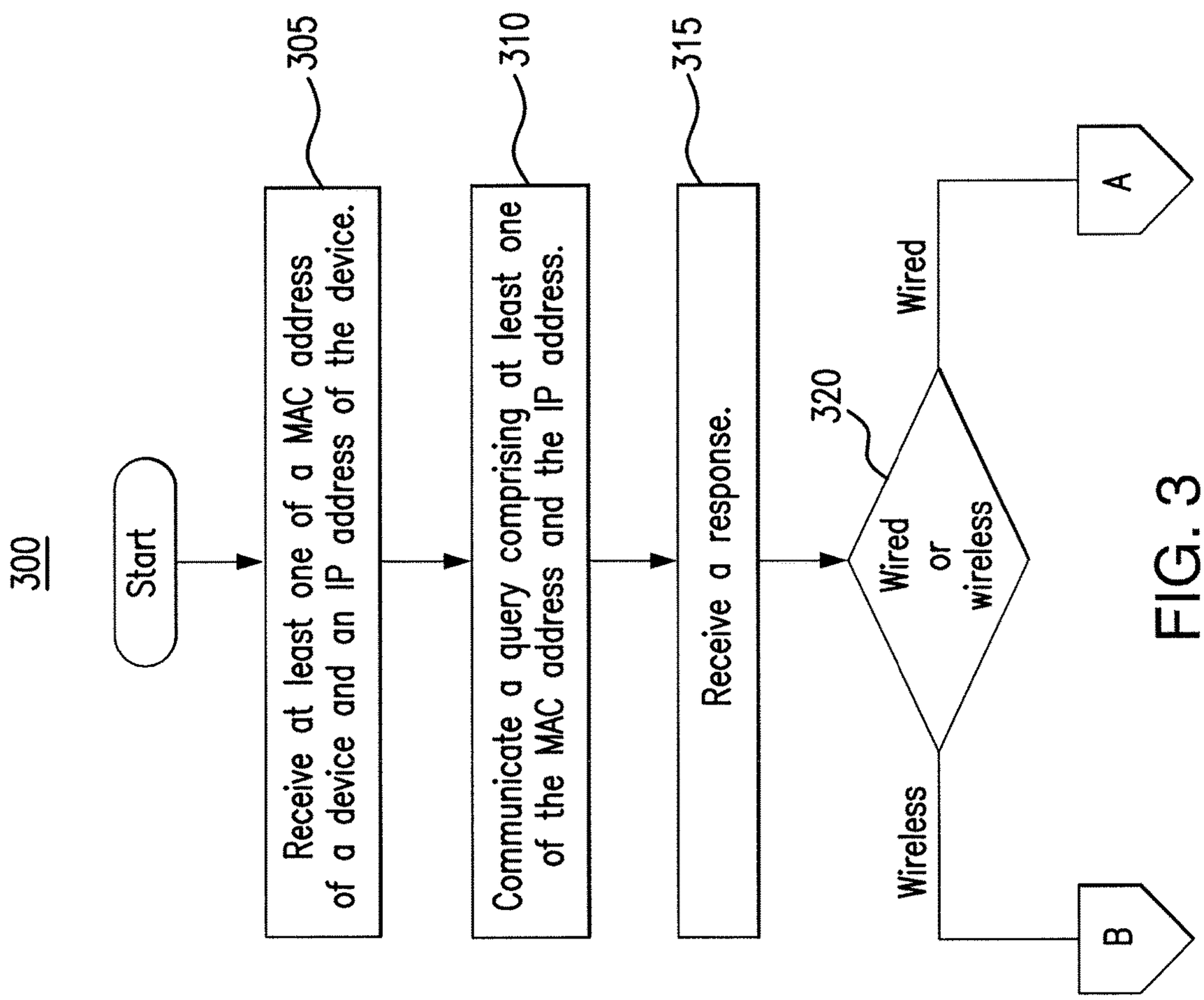

300
Start
Receive at least one of a MAC address of a device and an IP address of the device.
305
Communicate a query comprising at least one of the MAC address and the IP address.
310
Receive a response.
315
320
Wired or wireless
Wired
Wireless
A
B

FIG. 3

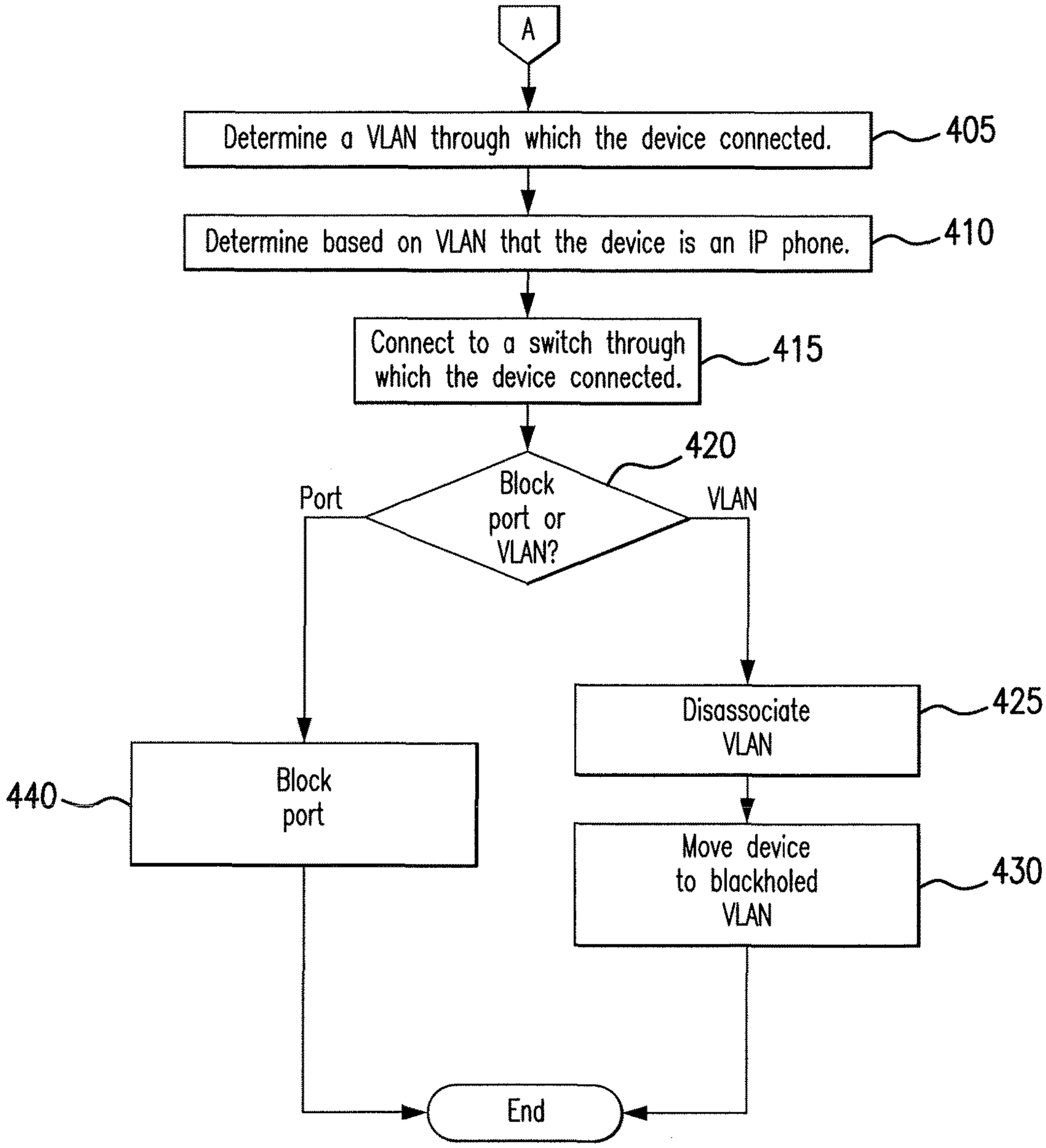

A
Determine a VLAN through which the device connected.
405
Determine based on VLAN that the device is an IP phone.
410
Connect to a switch through which the device connected.
415
420
Block port or VLAN?
Port
VLAN
Block port
440
Disassociate VLAN
425
Move device to blackholed VLAN
430
End

FIG. 4

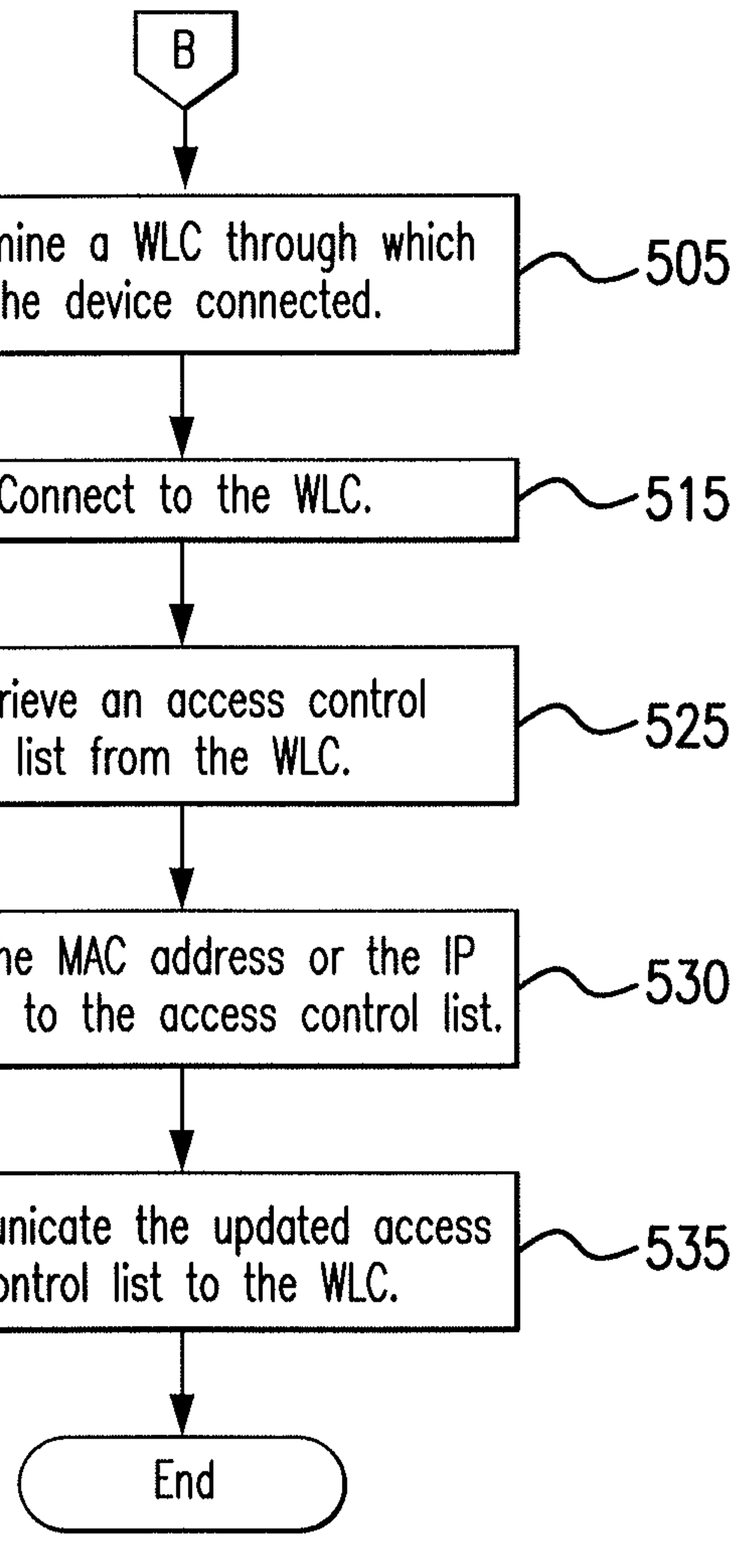

B
Determine a WLC through which the device connected.
505
Connect to the WLC.
515
Retrieve an access control list from the WLC.
525
Add the MAC address or the IP address to the access control list.
530
Communicate the updated access control list to the WLC.
535
End

FIG. 5

DEVICE BLOCKING TOOL

TECHNICAL FIELD

This disclosure relates generally to a tool for blocking devices from a network.

BACKGROUND

Network security should be maintained in order to prevent activity that can damage a network (e.g., intrusions data exfilteration/theft, insider threats, etc.). One step in ensuring network security is blocking undesirable devices, such as for example, devices that have exhibited malicious activity, unknown devices, non-compliant devices, and devices that are being used by malicious or rogue users.

SUMMARY OF THE DISCLOSURE

According to one embodiment, a wireless device blocking tool includes a user interface, a location engine, and a connection engine. The user interface receives at least one of a Media Access Control (MAC) address of a device and an Internet Protocol (IP) address of the device. The location engine communicates to an access control server at least one of the MAC address of the device and the IP address of the device. The location engine also receives a response from the access control server and determines, based on the response, whether the device connected to a network through a wireless connection or a wired connection. In response to a determination that the device connected to the network through the wireless connection, the location engine determines a wireless local area network controller (WLC) through which the device connected to the network and in response to a determination that the device connected to the network through the wired connection, the location engine determines a switch through which the device connected to the network. The connection engine connects to the determined WLC in response to the determination that the device connected to the network through the wireless connection and connects to the determined switch in response to the determination that the device connected to the network through the wired connection.

According to another embodiment, a method includes receiving at least one of a MAC address of a device and an IP address of the device and communicating to an access control server at least one of the MAC address of the device and the IP address of the device. The method also includes receiving a response from the access control server and determining, based on the response, whether the device connected to a network through a wireless connection or a wired connection. The method further includes in response to a determination that the device connected to the network through the wireless connection, determining a WLC through which the device connected to the network and in response to a determination that the device connected to the network through the wired connection, determining a switch through which the device connected to the network. The method also includes connecting to the determined WLC in response to the determination that the device connected to the network through the wireless connection and connecting to the determined switch in response to the determination that the device connected to the network through the wired connection.

According to another embodiment, a system includes an access control server, a WLC, a switch, and a wireless device blocking tool. The wireless device blocking tool receives at least one of a MAC address of a device and an IP address of the device and communicates to the access control server at least one of the MAC address of the device and the IP address of the device. The wireless device blocking tool receives a response from the access control server and determines, based on the response, whether the device connected to a network through a wireless connection or a wired connection. In response to a determination that the device connected to the network through the wireless connection, the wireless device blocking tool determines that the device connected to the network through the WLC and in response to a determination that the device connected to the network through the wired connection, wireless device blocking tool determines that the device connected to the network through the switch. The wireless device blocking tool also connects to the WLC in response to the determination that the device connected to the network through the wireless connection and connects to the switch in response to the determination that the device connected to the network through the wired connection.

Certain embodiments provide one or more technical advantages. For example, an embodiment improves the security of a network by ensuring that compromised devices are prevented from connecting to the network in the future. As another example, an embodiment improves the security of a network by ensuring that the connection point of a compromised device is properly identified. As yet another example, an embodiment improves network security by removing compromised devices that are connected to the network and by blocking these devices from subsequently reconnecting to the network. Certain embodiments may include none, some, or all of the above technical advantages. One or more other technical advantages may be readily apparent to one skilled in the art from the figures, descriptions, and claims included herein.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present disclosure, reference is now made to the following description, taken in conjunction with the accompanying drawings, in which:

FIG. **1** illustrates a system for blocking a device;

FIG. **2** illustrates the device blocking tool of the system of FIG. **1**; and

FIGS. **3** through **5** are flowcharts illustrating a method for blocking a device using the system of FIG. **1**.

DETAILED DESCRIPTION

Embodiments of the present disclosure and its advantages are best understood by referring to FIGS. **1** through **5** of the drawings, like numerals being used for like and corresponding parts of the various drawings.

Network security should be maintained in order to prevent activities that can damage the network. For example, when user credentials are stolen, hackers may access the network using the stolen credentials. Such access exposes the network to malware and theft. As another example, the network may be improperly accessed through social engineering attempts. When the social engineering attempts are successful, access to the network may be improperly granted. This again exposes the network to malware and/or theft. As another example, a malicious or rogue user may already be connected to the network and may be attempting to compromise the network from within (e.g., stealing data, opening connections to other malicious users, etc.).

One way that these activities occur is through compromised devices that connect to the network. For example, a computer infected by a virus and/or malware can infect other devices on the network when the computer connects to the network. As another example, an IP telephone connected to the network that has a phone number known by hackers may be a frequent target of social engineering attempts. As yet another example, unknown devices may be compromised devices that threaten the network and other devices on the network. As another example, a clean device that is being operated by a malicious or rogue user can pose a significant threat to the network. If these devices connect and/or stay connected to the network, then the network may be compromised.

Another way that these activities occur is through clean or compromised devices that are operated by malicious or rogue users. For example, a malicious user can connect a clean device to a network and then download viruses and/or malware over the network. As another example, the user can steal data stored over the network after connecting to the network. If these users are allowed to connect and reconnect to the network, then the network may be compromised.

As network technology improves, networks grow larger to include an increasing number of devices and access points. As a result, it becomes more challenging to timely locate and/or identify a compromised device on the network and to remove and/or block that device before the network is compromised. For example, it may be possible for a compromised device to connect to the network, compromise the network (e.g., through malicious activity), and disconnect from the network before the malicious activity is detected. As a result, the size of the network may result in the network being more easily compromised by devices.

This disclosure contemplates a device blocking tool that identifies and blocks compromised devices from connecting to a network. For example, the device blocking tool can identify a wireless device that connected to the network and update a wireless access control list of a wireless local area network (LAN) controller (WLC) through which the wireless device connected to the network to block that wireless device from subsequently connecting to the network. As another example, the device blocking tool can identify an Internet Protocol (IP) telephone connected to the network and update a wired access control list to block the IP phone and/or a port through which the IP phone connected to the network from subsequently connecting to the network. As a result, the device blocking tool can prevent both wired and wireless devices from subsequently connecting to the network. By keeping these devices off the network, the device blocking tool improves network security and minimizes the chances that the network will be compromised. Furthermore, the device blocking tool protects other devices on the network from being infected. The device blocking tool will be described in more detail using FIGS. **1** through **5**. FIG. **1** will describe the device blocking tool generally. FIGS. **2** through **5** will describe the device blocking tool in more detail.

FIG. **1** illustrates a system for blocking a device. As illustrated in FIG. **1**, system **100** includes users **105**, devices **110**A and **110**B, a network **115**, a device blocking tool **120**, a port **125**, a switch **130**, an access point **135**, a wireless LAN controller (WLC) **140** and an access control server **117**. In particular embodiments, by using system **100**, compromised devices are prevented from connecting to network **115** thereby improving network security. Furthermore, system **100** may improve network security by removing compromised devices that are connected to the network and by blocking these devices from subsequently reconnecting to the network.

Device **110** is any device capable of connecting to network **115**. For example, device **110** may be a personal computer, a mobile phone, an internet protocol telephone and/or a laptop. This disclosure contemplates device(s) **110** being any appropriate device that can communicate over network **115**. For example, device(s) **110** may be a computer, a laptop, a wireless or cellular telephone, an electronic notebook, a personal digital assistant, a tablet, a server, a mainframe, or any other device capable of receiving, processing, storing, and/or communicating information with other components of system **100**. Device(s) **110** may also include a user interface, such as a display, a microphone, keypad, or other appropriate terminal equipment usable by a user. In some embodiments, an application executed by device(s) **110** may perform the functions described herein.

If device **110**A or **110**B is a compromised device (e.g., exhibits malicious activity), then device **110**A or **110**B could threaten the health of network **115** and/or other devices **110** connected to network **115**. For example, if a personal computer is infected with a virus and/or malware when that computer connects to network **115**, the virus and/or malware could spread to other devices connected to network **115**. As another example, if an IP telephone connected to network **115** has a telephone number that is known to hackers and/or spammers, then that IP telephone could be a frequent target of social engineering attempts. The social engineering attempts could compromise the security of network **115** and/or the security of other devices connected to network **115**. As yet another example, even if a computer is clean, it could still be operated by a malicious or rogue user that compromises the network. As a result, it is important to remove these devices from network **115** and to prevent them from subsequently connecting to network **115**.

However, if network **115** is large and has several connection and/or access points through which numerous devices can connect to network **115**, then it becomes difficult to identify the compromised device and to prevent that device from subsequently connecting to network **115**. In some instances, it is challenging to simply identify the compromised device because of the amount of activity occurring over network **115**. If the device is not identified, then it is not possible to remove and/or prevent that device from connecting to network **115**. As another example, even if the device could be identified it could also be challenging to prevent that device from connecting to network **115**. For example, if a compromised laptop connects through a wired connection, performs malicious activity, and then disconnects from network **115**, that compromised laptop may still connect to network **115** in the future through a wireless access point. In particular embodiments, by using device blocking tool **120** it is possible to identify a compromised device and to block that device from subsequently connecting to network **115**.

Network **115** facilitates communication between and amongst the various components of system **100**. This disclosure contemplates network **115** being any suitable network operable to facilitate communication between the components of system **100**. Network **115** may include any interconnecting system capable of transmitting audio, video, signals, data, messages, or any combination of the preceding. Network **110** may include all or a portion of a public switched telephone network (PSTN), a public or private data network, a local area network (LAN), a metropolitan area network (MAN), a wide area network (WAN), a local, regional, or global communication or computer network,

such as the Internet, a wireline or wireless network, an enterprise intranet, or any other suitable communication link, including combinations thereof, operable to facilitate communication between the components.

Access control server **117** controls access to network **115**. For example, access control server **117** may store and maintain an access control list that indicates which devices are allowed to connect to network **115** and/or what devices are not allowed to connect to network **115**. This access control list can be updated to change which devices may or may not connect to network **115**.

When a device **110** attempts to connect to network **115**, access control server **117** may receive a connection request from device **110**. Access control server **117** may log the connection request. Access control server **117** may also log an identifier (e.g., name, media access control address, Internet Protocol address, etc.) for device **110**, whether the connection request is accepted and/or denied, whether the connection is a wired or wireless connection, any activity that device **110** performs while connected to network **115**, and when device **110** disconnects from network **115**. Access control server **117** may store this log internally. An entry in the log for the device may be created when the device connects to network **115**. The log may also indicate an access point through which device **110** connected to network **115**. In particular embodiments, by consulting access control server **117**, a compromised device **110** may be identified.

Port **125**, switch **130**, access point **135** and wireless LAN controller **140** are networking components through which device **110** may connect to network **115**. As illustrated in FIG. **1**, port **125** and wireless LAN controller **140** may be coupled to switch **130**. Furthermore, access point **135** may be coupled to wireless LAN controller **140**. Device **110** may connect to network **115** through a wired connection by connecting through port **125** and switch **130**. Furthermore, device **110** may connect to network **115** through a wireless connection by connecting through access point **135**, wireless LAN controller **140** and switch **130**. In certain embodiments, device **110** may connect to network **115** through a wireless connection by connecting through access point **135** and wireless LAN controller **140**.

Port **125** may be a communication endpoint for network **115**. Port **125** may be a hardware port (e.g., a physical port, an Ethernet port, etc.) or a software port. Port **125** may identify a specific process or a type of service. Port **125** may be identified by a number referred to as a port number. Different port numbers may identify different services provided by the ports. System **100** may include any number of ports **125**. By implementing additional ports **125**, the number of services and connections supported by system **100** may be expanded.

Switch **130** is any appropriate communications equipment, including hardware and any appropriate controlling logic, for interconnecting elements and facilitating communications to and from endpoint devices. Switch **130** may include gateways, call managers, routers, hubs, switches, access points, base stations, cellular towers, radio networks, satellite telephone equipment implementing appropriate protocols for wireless telephony communications. It should be understood that various embodiments may operate using any number of switches **130**. In addition, various embodiments may incorporate switches **130** in other wired or wireless networks coupled to the communications network **115** of system **100**. System **100** may include any number of switches **130**. By implementing additional switches **130**, the number of connections to system **100** may be expanded.

Access point **135** is any networking hardware device (and accompanying software) that allows a device to connect to network **115**. Access point **135** may include a router or any component thereof. Access point **135** may allow for both wireless connections and wired connections to network **115**. For example, device **110** may connect wirelessly to access point **135** or connect to access point **135** via an Ethernet cable. System **100** may include any number of access points **135**. By implementing more access points **135**, the physical coverage area of network **115** can be expanded.

Wireless local area network (LAN) controller (WLC) **140** controls and manages access point **135**. WLC **145** may be used to manage and control any number of access points **135** of system **100**. WLC **140** may configure access points **135** to connect to network **115**. In particular embodiments, WLC **140** may be used in combination with access points **135** to allow wireless connections to network **115**. In some embodiments, WLC **140** may screen wireless connection attempts to network **115** and block connection attempts that are deemed compromised. For example, WLC **140** may maintain a wireless access control list **170** that identifies devices that should be prevented from connecting wirelessly to network **115**. Wireless LAN controller **140** can connect to access point **135** and vice versa to allow for devices to connect to network **115** through access point **135** and wireless LAN controller **140**.

Device blocking tool **120** identifies compromised devices **110** and blocks those devices **110** from subsequently connecting to network **115**. As illustrated in FIG. **1**, device blocking tool **120** includes a processor **145** and a memory **150**. This disclosure contemplates processor **145** and memory **150** being configure to perform any of the tasks of device blocking tool **120** disclosed herein. In particular embodiments, by using device blocking tool **120**, network security is improved because compromised devices are identified and prevented from subsequently connecting back to the network.

Processor **145** is any electronic circuitry, including, but not limited to microprocessors, application specific integrated circuits (ASIC), application specific instruction set processor (ASIP), and/or state machines, that communicatively couples to memory **150** and controls the operation of device blocking tool **120**. Processor **145** may be 8-bit, 16-bit, 32-bit, 64-bit or of any other suitable architecture. Processor **145** may include an arithmetic logic unit (ALU) for performing arithmetic and logic operations, processor registers that supply operands to the ALU and store the results of ALU operations, and a control unit that fetches instructions from memory and executes them by directing the coordinated operations of the ALU, registers and other components. Processor **145** may include other hardware and software that operates to control and process information. Processor **145** executes software stored on memory to perform any of the functions described herein. Processor **145** controls the operation and administration of device blocking tool **120** by processing information received from network **115**, device(s) **110**, and memory **150**. Processor **145** may be a programmable logic device, a microcontroller, a microprocessor, any suitable processing device, or any suitable combination of the preceding. Processor **145** is not limited to a single processing device and may encompass multiple processing devices.

Memory **150** may store, either permanently or temporarily, data, operational software, or other information for processor **145**. Memory **150** may include any one or a combination of volatile or non-volatile local or remote devices suitable for storing information. For example,

memory **150** may include random access memory (RAM), read only memory (ROM), magnetic storage devices, optical storage devices, or any other suitable information storage device or a combination of these devices. The software represents any suitable set of instructions, logic, or code embodied in a computer-readable storage medium. For example, the software may be embodied in memory **150**, a disk, a CD, or a flash drive. In particular embodiments, the software may include an application executable by processor **145** to perform one or more of the functions described herein.

Device blocking tool **120** may be used to identify and to block both wired and wireless devices from connecting to network **115**. Device blocking tool **120** may first receive information that identifies a device, such as for example a media access control (MAC) address **155**, an Internet Protocol (IP) address **160**, a hostname, a username stored on the device, and/or any other appropriate identifying information. In particular embodiments, MAC address **155** and IP address **160** are provided by a user through a user interface of device blocking tool **120**. For example, the user may have typed MAC address **155** and/or IP address **160** using a keyboard of device blocking tool **120**. Device blocking tool **120** may use MAC address **155** and IP address **160** to identify a device and/or to block a device from network **115**. Although this disclosure describes device blocking tool **120** using MAC address **155** and IP address **160** to identify and block a device, this disclosure contemplates device blocking tool **120** using any appropriate information to identify and to block a device.

Device blocking tool **120** communicates one or more of MAC address **155** and IP address **160** to access control server **117** to identify a device. Device blocking tool **120** may receive response **165** from access control server **117** in response to transmitting MAC address **155** and/or IP address **160** to access control server **117**. Response **165** may indicate the identity and activities of a device with MAC address **155** and/or IP address **160**. For example, if a device **110**B connected to network **115** through access point **135**, then response **165** may indicate that device **110**B connected wirelessly to access point **135**. As another example, if device **110**A connected through port **125** to network **115**, then response **165** may indicate that device **110**A connected through a wired connection to network **115**. Access control server **117** may generate response **165** based on information logged in access control server **117**.

Based on response **165**, device blocking tool **120** may determine whether the identified device connected to network **115** through a wireless connection or through a wired connection. Based on that determination, device blocking tool **120** may block the device differently. For a device that connected to network **115** through a wireless connection, that device can be blocked through wireless LAN controller **140**. For a device that connected to network **115** through a wired connection, that device can be blocked through access control server **117**.

If device blocking tool **120** determines that the device identified in response **165** connected to network **115** through a wireless connection, device blocking tool **120** may proceed to determine whether that device should be blocked. In particular embodiments, device blocking tool **120** may present information in response **165** to a user. The information may indicate the activities of the identified device. The user may then determine whether that activity is malicious or not. The user can then decide whether the device should be blocked and notify device blocking tool **120** of that decision. If the device should be blocked, device blocking tool **120** may connect to wireless LAN controller **140** and retrieve wireless access control list **170** from wireless LAN controller **140**. Device blocking tool **120** may then update wireless access control list **170** by adding one or more of MAC address **155** and IP address **160** to wireless access control list **170**. Then, device blocking tool **120** may send the updated wireless access control list **170** back to wireless LAN controller **140**. In this manner, device blocking tool **120** may indicate to wireless LAN controller **140** that the device associated with MAC address **155** and IP address **160** should be blocked from connecting wirelessly to network **115**. As a result, wireless LAN controller **140** will block subsequent attempts by the device to connect through an access point **135** of wireless LAN controller **140**. In this manner, device blocking tool **120** may prevent the compromised device from connecting wirelessly to network **115** through any access point **135**.

If response **165** indicates that the device connected through a wired connection to network **115**, device blocking tool **120** may then determine a type for the device. For example, device blocking tool **120** may determine whether the device is a personal computer or an IP telephone. Device blocking tool **120** may make this determination using a virtual local area network (VLAN) type indicated by response **165**. Response **165** may indicate a VLAN **175** through which the device connected to network **115**. VLAN **175** may be associated with a number that identifies the VLAN. VLAN **175** may also be associated with a type that indicates the type of the device. For example, VLAN **175** type may be an "access type" that indicates that the device is a personal computer. As another example, VLAN **175** may be a "voice type" that indicates that the device is a telephone (e.g., an IP telephone). Based on the VLAN **175** type, device blocking tool **120** can determine whether the device is a personal computer or an IP phone. In particular embodiments, response **165** also indicates port **125** through which the device connected to network **115**. Device blocking tool **120** presents this information, including VLAN **175** and port **125**, to a user. The user can then decide whether the device should be blocked from subsequently connecting to network **115**.

Device blocking tool **120** may present various options for blocking the device. For example, device blocking tool **120** may present an option to block all connections through the identified port **125**. As another example, device blocking tool **120** may present an option to block the VLAN **175** through which the device connected to network **115**. In this manner, device blocking tool **120** may allow for a device-specific blocking, a port-specific blocking, and/or a VLAN **175** specific blocking. If port **125** is blocked, then any device and/or service that attempts to connect through port **125** will be blocked. In this manner, device blocking tool **120** can block devices and/or services. Device blocking tool **120** may implement a specific type of blocking (e.g., voice block and/or access block) based on the type of VLAN **175** (voice or access) to block a specific type of device that connects through VLAN **175** such as, for example, an IP telephone or a personal computer.

Device blocking tool **120** may block VLAN **175** and/or port **125** by retrieving a wired access control list **180** from access control server **117**. Then, device blocking tool **120** may add one or more of MAC address **155**, IP address **160**, port **125**, and/or VLAN **175** to wired access control list **180** to produce an updated wired access control list **185**. Device blocking tool **120** may then communicate updated wired access control list **185** to access control server **117**. As a result, access control server **117** may prevent connections

through port **125** and/or VLAN **175** and/or connections from the blocked device. In this manner, device blocking tool **120** may block compromised devices from connecting to network **115** through a wired connection.

If a blocked device attempts to connect to network **115**, an alert will be communicated to the device, device blocking tool **120**, and/or an administrator of network **115** indicating that the blocked device is attempting to connect to network **115**. Appropriate response can then be taken to identify and stop the user of the device. Device blocking tool **120** will be discussed in more detail using FIGS. **2** through **5**.

FIG. **2** illustrates the device blocking tool **120** of the system **100** of FIG. **1**. As illustrated in FIG. **2**, device blocking tool **120** includes a user interface **200**, a location engine **205**, a retrieval engine **210**, an update engine **215** and a connection engine **220**. In particular embodiments, by using device blocking tool **120** network security is improved because compromised devices are blocked from subsequently connecting to network **115**.

Device blocking tool **120** may receive input through user interface **200**. For example, user interface **200** may receive MAC address **155** and/or IP address **160**. In certain embodiments, a user may input MAC address **155** and/or IP address **160** into user interface **200** through an input device such as, for example, a keyboard or a mouse. One example algorithm that user interface **200** follows is: wait for input from an input device; receive, input from the input device; and communicate the input to other components of device blocking tool **120**. The input may be MAC address **155** and/or IP address **160**. This disclosure contemplates user interface **200** receiving any type of information that identifies a device. For example, user interface **200** may receive a hostname of a device or a username stored on the device.

Location engine **205** may receive MAC address **155** and/or IP address **160** from user interface **200**. Location engine **205** may then communicate MAC address **155** and/or IP address **160** to an access control server. An example algorithm for location engine **205** is: waiting for information from user interface **200**; receiving information from user interface **200**; and sending the information to the access control server. The information may include MAC address **155** and/or IP address **160**. Location engine **205** may communicate any information that identifies a device to the access control server, such as for example, a hostname of a device or a username stored on the device.

Location engine **205** may receive response **165** from the access control server. Response **165** may be generated and/or communicated in response to receiving MAC address **155** and/or IP address **165**. An example algorithm for location engine **205** is: sending information to the access control server; waiting for response **165** from the access control server; and receiving response **165** from the access control server.

Location engine **205** may determine based on response **165** whether a device identified by MAC address **155** and/or IP address **160** connected to a network through a wired connection or through a wireless connection. For example, information in response **165** may indicate the location of a connection through which the device connected to the network. Response **165** may also indicate whether that location is a wireless access point or a wired access point. Based on this information, location engine **205** may determine whether the device connected through the wireless connection or the wired connection. An example algorithm for location engine **205** is: receive response **165** from the access control server; examine response **165** to see whether response **165** indicates that a device connected through a wireless connection or through a wired connection; and determine, based on that information, whether the device connected through the wired connection or through the wireless connection.

If location engine **205** determines that the device connected through a wireless connection, location engine **205** may then determine a wireless LAN controller through which the device connected to the network. Response **165** may include information that identifies the wireless LAN controller through which the device connected to the network. Location engine **205** may use that information to determine the wireless LAN controller through which the device connected to the network. An example algorithm for location engine **205** is: determine based on response **165** that a device connected through a wireless connection; analyze response **165** to determine a wireless LAN controller through which the device connected to the network; and use the information in response **165** to determine the wireless LAN controller through which the device connected to the network.

If location engine **205** determines that the device connected through a wired connection, location engine **205** may determine a switch through which the device connected to the network. Response **165** may indicate the switch through which the device connected to the network. Location engine **205** may use that information in response **165** to determine the switch through which the device connected to the network. An example algorithm for location engine **205** is: determine based on information in response **165** that the device connected through the wired connection; analyze response **165** to see if response **165** identifies a switch through which the device connected to the network; determine that response **165** identifies the switch; and use that information to determine the switch through which the device connected to the network.

Location engine **205** may also determine a VLAN **175** based on information in response **165**. VLAN **175** may be the VLAN through which the device connected to the network if the device connected through the wired connection. Response **165** may indicate a number identifying VLAN **175**. Location engine **205** may use that number to identify VLAN **175**. An example algorithm for location engine **205** is: determine that the device connected through the wired connection; analyze response **165** to see if response **165** includes a number that identifies a VLAN; and use that number to identify the VLAN.

Location engine **205** may use VLAN **175** to determine a type of the device. For example, location engine **205** may use VLAN **175** to determine whether the device is an IP telephone or a personal computer. Location engine **205** may store a table that maps VLANs to device types. Location engine **205** may consult that table to determine whether the device is an IP telephone or a personal computer. An example algorithm for location engine **205** is: determine a number that identifies VLAN **175**; find the number in a column of a table; find a device type corresponding to that number in the table; and determine based on that device type that the device is an IP telephone or a personal computer.

Connection engine **220** may connect device blocking tool **120** to a component of system **100**. For example, connection engine **220** may open a connection **230** to a wireless LAN controller through which a device connected to the network if the device connected through a wireless connection. As another example, connection engine **220** may open connection **230** to a switch through which a device connected to the network if the device connected through a wired connection. An example algorithm for location engine **205** is: wait for

information from location engine **205**; receive information from location engine **205**; determine from that information that a device connected through a wireless connection; connect to a wireless LAN controller through which the device connected to the network based on that information; determine based on that information that another device connected through a wired connection; and connect to a switch identified in that information through which the device connected. In each of these examples, connection engine **220** connects to a component of system **100** by opening connection **230** with that component.

Retrieval engine **210** may retrieve wireless access control list **170** and wired access control list **180** from various components of system **100**. For example, retrieval engine **210** may retrieve wireless access control list **170** from a wireless LAN controller. As another example, retrieval engine **210** may retrieve wired access control list **180** from an access control server. Retrieval engine **210** may retrieve one or more of wireless access control list **170** and wired access control list **180** based on determinations of whether a device connected through a wireless connection or a wired connection. For example, if location engine **205** determines that a device connected through a wireless connection, then retrieval engine **210** may retrieve wireless access control list **170** from a wireless LAN controller through which the device connected to the network. As another example, if location engine **205** determines that a device connected though a wired connection, then retrieval engine **210** may retrieve wired access control list **180** from an access control server. An example algorithm for retrieval engine **210** is: wait for information from location engine **210**; receive information from location engine **210** indicating whether a device connected through a wireless connection or a wired connection; determine from the information that the device connected through a wireless connection; in response to that determination, request wireless access control list **170** from a wireless LAN controller; receive wireless access control list **170** from the wireless LAN controller; determine from the information that a device connected through a wired connection; in response to that determination, request wired access control list **180** from an access control server; receive wired access control list **180** from the access control server.

Update engine **215** may update wireless access control list **170** and wired access control list **180** to block devices from subsequently connecting to a network. For example, update engine **215** may add MAC address **155** and/or IP address **160** to wireless access control list **170** and/or wired access control list **180** to produce updated wireless access control list **225** and updated wired access control list **185** respectively. Update engine **215** may then communicate updated wireless access control list **225** to a wireless LAN controller and updated access control list **185** to an access control server to prevent devices from connecting through a wireless connection and a wired connection respectively. An example algorithm for update engine **215** is as follows: receive a MAC address and an IP address from user interface **200**; receive a wireless access control list; add one or more of the MAC address and the IP address to the wireless access control list to produce an updated wireless access control list; send the updated wireless access control list to a wireless LAN controller; receive a wired access control list from retrieval engine **210**; add one or more of the MAC address and the IP address to the wired address control list to produce an updated wired access control list; and send the wired access control to an access control server.

In particular embodiments, update engine **215** disassociates the VLAN. For example, update engine **215** may take the VLAN offline, delete the VLAN, disconnect the device from the VLAN, and/or prevent further connections to the VLAN. Then, update engine **215** moves the device to a blackholed VLAN. For example, update engine **215** may reassign a connection of the device to a VLAN that is not operational and/or a VLAN that does not provide services to the device, but rather monitors the device.

In particular embodiments, retrieval engine **210** may retrieve a port and a VLAN from a switch. For example, a device may have connected to a network through a particular port or VLAN. Retrieval engine **210** may retrieve from the switch the port and/or VLAN through which the device connected to the network. As a result, retrieval engine **210** may connect to the switch, request the port or VLAN, and receive the port or VLAN in response.

In some embodiments, retrieval engine **210** may retrieve from a wireless LAN controller an identification of a wireless access point through which a device connected to a network. For example, retrieval engine **210** may connect to the wireless LAN controller, request a wireless access point through which a device connected to a network, and receive information that identifies the wireless access point. Furthermore, retrieval engine may retrieve from the wireless LAN controller an identification of another device that connected to the network through the wireless LAN controller. For example, retrieval engine **210** may connect to the wireless LAN controller, request a list of devices that connected to the network through the wireless LAN controller, and receive that list identifying the devices.

FIGS. **3** through **5** are flowcharts illustrating a method **300** for blocking a device using the system **100** of FIG. **1**. In particular embodiments, device blocking tool **120** may perform method **300**. By performing method **300**, device blocking tool **120** may improve the security of a network by preventing compromised devices from subsequently connecting to the network.

Device blocking tool **120** may begin by receiving at least one of a MAC address of a device and an IP address of the device in step **305**. Device blocking tool **120** communicates a query comprising at least one of the MAC address and the IP address in step **310**. In particular embodiments, device blocking tool **120** may communicate the query to an access control server. Device blocking tool **120** may then receive a response in step **315**. In some embodiments, device blocking tool **120** may receive the response from the access control server in response to communicating the query. Based on information in the response, device blocking tool **120** may determine whether the device connected through a wired connection or a wireless connection in step **320**. Depending on whether the device connected through a wired or a wireless connection, device blocking tool **120** may attempt to block the device in a particular manner. If the device connected through a wired connection, device blocking tool **120** may proceed to the process described in FIG. **4**. Device blocking tool **120** may determine a VLAN and/or a switch through which the device connected in step **405**. The VLAN may be identified by a number. The VLAN (or a type of the VLAN) may indicate the type of the device. For example, the VLAN type (voice or data) may indicate whether the device is an IP telephone or a personal computer. In step **410**, device blocking tool **120** may determine, based on the VLAN type, that the device is an IP telephone. Then in step **415**, device blocking tool **120** may connect to the switch through which the device connected. Device blocking tool **120** may then determine whether to block a port through which the device connected or the VLAN in step **420**. In

particular embodiments, a user may indicate to device blocking tool **120** whether the port or the VLAN should be blocked.

If the VLAN should be blocked, device blocking tool **120** disassociates the VLAN in step **425**. For example, device blocking tool **120** may take the VLAN offline, delete the VLAN, disconnect the device from the VLAN, and/or prevent further connections to the VLAN. In step **430**, device blocking tool **120** moves the device to a blackholed VLAN. For example, device blocking tool **120** may reassign a connection of the device to a VLAN that is not operational and/or a VLAN that does not provide services to the device, but rather monitors the device.

In one embodiment, device blocking tool **120** retrieves an access control list for VLANs. In particular embodiments, the access control list for VLANs may be retrieved from an access control server. Device blocking tool **120** may then add the MAC address or the IP address to the access control list for VLANs. Then, device blocking tool **120** may communicate the updated access control list for. In particular embodiments, the updated access control list for VLANs is communicated back to the access control server. In certain embodiments, device blocking tool **120** adds the VLAN number to the access control list for VLANs to block the VLAN entirely regardless of which device connected through the VLAN.

If the port should be blocked, device blocking tool **120** may block the port in step **440**. For example, device blocking tool **120** may refuse subsequent connections and/or services through that port. As another example, device blocking tool **120** may remove that port from service. In one embodiment, device blocking tool **120** retrieves an access control list for ports. The access control list for ports may be retrieved from an access control server. Device blocking tool **120** may then add the MAC address or the IP address to the access control list for ports. Then, device blocking tool **120** may communicate the updated access control list for ports. In particular embodiments, the updated access control list for ports may be communicated back to the access control server. In some embodiments, device blocking tool **120** may add a number identifying the port to the access control list for ports to block the port entirely regardless of which device connected through the port.

If device blocking tool **120** determines that the device connected through a wireless connection, device blocking tool **120** may proceed to the process described in FIG. **5**. Device blocking tool **120** may determine a wireless LAN controller through which the device connected in step **505**. In particular embodiments, device blocking tool **120** may make this determination using information in the response received in step **315**. In step **515**, device blocking tool **120** may connect to the wireless LAN controller. Device blocking tool **120** may then retrieve an access control list from the wireless LAN controller in step **525**. In step **530**, device blocking tool **120** may add the MAC address or the IP address to the access control list. Device blocking tool **12** may then communicate the updated access control list to the wireless LAN controller in step **535**. In this manner, the wireless LAN controller may be informed of devices that it should not allow to connect to the network.

Modifications, additions, or omissions may be made to method **300** depicted in FIGS. **3** through **5**. Method **300** may include more, fewer, or other steps. For example, steps may be performed in parallel or in any suitable order. While discussed as device blocking tool **120** performing the steps, any suitable component of system **100**, such as device(s) **110** for example, may perform one or more steps of the method.

Although the present disclosure includes several embodiments, a myriad of changes, variations, alterations, transformations, and modifications may be suggested to one skilled in the art, and it is intended that the present disclosure encompass such changes, variations, alterations, transformations, and modifications as fall within the scope of the appended claims.

What is claimed is:

1. A wireless device blocking tool comprising:

a user interface configured to receive at least one of a Media Access Control (MAC) address of a device and an Internet Protocol (IP) address of the device;

a hardware processor configured to implement:

a location engine configured to:

communicate at least one of the MAC address and the IP address to an access control server;

receive a response from the access control server in response to communicating at least one of the MAC address and the IP address;

determine, based on the response, whether the device connected to directly a network through a wireless connection at a first hardware access point or a wired connection at a second hardware access point;

in response to a determination that the device connected to the network through the wireless connection, determine a wireless local area network controller (WLC) through which the device connected to the network, the WLC separate from the first and second hardware access points, the WLC configured to:

manage a plurality of access points, the plurality of access points comprising the first and second hardware access points; and

connect to the first and second hardware access points to allow for devices to connect to the network through the first and second hardware access points; and

in response to a determination that the device connected to the network through the wired connection, determine a switch through which the device connected to the network;

a connection engine configured to:

connect to the determined WLC in response to the determination that the device connected to the network through the wireless connection; and

connect to the determined switch in response to the determination that the device connected to the network through the wired connection; and

an update engine configured to:

add at least one of the MAC address and the IP address of the device to a wired access control list from the access control server to prevent the device from connecting to the network through the wired connection if the device connected to the network through the wired connection; and

add at least one of the MAC address and the IP address of the device to a wireless access control list from the access control server to prevent the device from connecting to the network through the wireless connection if the device connected to the network through the wireless connection.

2. The wireless device blocking tool of claim **1**, further comprising a retrieval engine configured to retrieve, from the switch, a port through which the device connected to the network and a virtual local access network through which the device connected to the network.

3. The wireless device blocking tool of claim 2, wherein the update engine is configured to add at least one of the port and the MAC address of the device to an access control list to prevent the device from connecting to the network through the wired connection.

4. The wireless device blocking tool of claim 1, wherein the access control server stores a log comprising an entry, the entry indicating whether the device connected to the network through the wireless connection or the wired connection, the entry created when the device connected to the network.

5. The wireless device blocking tool of claim 1, further comprising a retrieval engine configured to retrieve, from the WLC, an identification of a wireless access point through which the device connected to the network, an access control list stored by the WLC, and an identification of a second device connected to the network through the WLC.

6. The wireless device blocking tool of claim 1, wherein:

the user interface is further configured to receive at least one of a hostname of the device and a username stored on the device; and

the location engine is further configured to communicate at least one of the hostname of the device and the username stored on the device to the access control server.

7. A method comprising:

receiving at least one of a Media Access Control (MAC) address of a device and an Internet Protocol (IP) address of the device;

communicating a query to an access control server, the query comprising at least one of the MAC address of the device and the IP address of the device;

receiving a response from the access control server in response to communicating the query;

determining, based on the response, whether the device connected directly to a network through a wireless connection at a first hardware access point or a wired connection at a second hardware access point;

in response to a determination that the device connected to the network through the wireless connection, determining a wireless local area network controller (WLC) through which the device connected to the network, the WLC separate from the first and second hardware access points, the WLC configured to:

manage a plurality of access points, the plurality of access points comprising the first and second hardware access points; and

connect to the first and second hardware access points to allow for devices to connect to the network through the first and second hardware access points;

in response to a determination that the device connected to the network through the wired connection, determining a switch through which the device connected to the network;

connecting to the determined WLC in response to the determination that the device connected to the network through the wireless connection;

connecting to the determined switch in response to the determination that the device connected to the network through the wired connection;

adding at least one of the MAC address and the IP address of the device to a wired access control list from the access control server to prevent the device from connecting to the network through the wired connection if the device connected to the network through the wired connection; and

adding at least one of the MAC address and the IP address of the device to a wireless access control list from the access control server to prevent the device from connecting to the network through the wireless connection if the device connected to the network through the wireless connection.

8. The method of claim 7, further comprising retrieving, from the switch, a port through which the device connected to the network and a virtual local access network through which the device connected to the network.

9. The method of claim 8, further comprising adding at least one of the port and the MAC address of the device to an access control list to prevent the device from connecting to the network through the wired connection.

10. The method of claim 7, wherein the access control server stores a log comprising an entry, the entry indicating whether the device connected to the network through the wireless connection or the wired connection, the entry created when the device connected to the network.

11. The method of claim 7, further comprising retrieving, from the WLC, an identification of a wireless access point through which the device connected to the network, an access control list stored by the WLC, and an identification of a second device connected to the network through the WLC.

12. The method of claim 7, further comprising:

receiving at least one of a hostname of the device and a username stored on the device; and

communicating at least one of the hostname of the device and the username stored on the device to the access control server.

13. A system comprising:

an access control server;

a wireless local area network controller (WLC);

a switch; and

a wireless device blocking tool configured to:

receive at least one of a Media Access Control (MAC) address of a device and an Internet Protocol (IP) address of the device;

communicate a query to the access control server, the query comprising at least one of the MAC address of the device and the IP address of the device;

receive a response from the access control server in response to communicating the query;

determine, based on the response, whether the device connected directly to a network through a wireless connection at a first hardware access point or a wired connection at a second hardware access point;

in response to a determination that the device connected to the network through the wireless connection, determine that the device connected to the network through the WLC, the WLC separate from the first and second hardware access points, the WLC configured to:

manage a plurality of access points, the plurality of access points comprising the first and second hardware access points; and

connect to the first and second hardware access points to allow for devices to connect to the network through the first and second hardware access points;

in response to a determination that the device connected to the network through the wired connection, determine that the device connected to the network through the switch;

connect to the WLC in response to the determination that the device connected to the network through the wireless connection;

connect to the switch in response to the determination that the device connected to the network through the wired connection;

add at least one of the MAC address and the IP address of the device to a wired access control list from the access control server to prevent the device from connecting to the network through the wired connection if the device connected to the network through the wired connection; and

add at least one of the MAC address and the IP address of the device to a wireless access control list from the access control server to prevent the device from connecting to the network through the wireless connection if the device connected to the network through the wireless connection.

14. The system of claim **13**, wherein the wireless device blocking tool is further configured to retrieve, from the switch, a port through which the device connected to the network and a virtual local access network through which the device connected to the network.

15. The system of claim **14**, wherein the wireless device blocking tool is further configured to add at least one of the port and the MAC address of the device to an access control list to prevent the device from connecting to the network through the wired connection.

16. The system of claim **13**, wherein the access control server stores a log comprising an entry, the entry indicating whether the device connected to the network through the wireless connection or the wired connection, the entry created when the device connected to the network.

17. The system of claim **13**, wherein the wireless device blocking tool is further configured to retrieve, from the WLC, an identification of a wireless access point through which the device connected to the network, an access control list stored by the WLC, and an identification of a second device connected to the network through the WLC.

18. The system of claim **13**, wherein the wireless device blocking tool is further configured to:

receive at least one of a hostname of the device and a username stored on the device; and

communicate at least one of the hostname of the device and the username stored on the device to the access control server.

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